E/ECE/324
E/ECE/TRANS/505 Rev.1/Add.82/Rev.1/Amend.4

3 October 2000

AGREEMENT

CONCERNING THE ADOPTION OF UNIFORM TECHNICAL PRESCRIPTIONS FOR WHEELED VEHICLES, EQUIPMENT AND PARTS WHICH CAN BE FITTED AND/OR BE USED ON WHEELED VEHICLES AND THE CONDITIONS FOR RECIPROCAL RECOGNITION OF APPROVALS GRANTED ON THE BASIS OF THESE PRESCRIPTIONS */

(Revision 2, including the amendments entered into force on 16 October 1995)

Addendum 82: Regulation No. 83

Revision 1- Amendment 4

Incorporating:
04 series of amendments - Date of entry into force: 13 November 1999
Corrigendum 1 to Supplement 1 to the 03 series of amendments subject of Depositary Notification C.N.710.1999.TREATIES-1 dated 6 August 1999
Corrigendum 1 to the 04 series of amendments subject of Depositary Notification C.N.91.2000.TREATIES-1 dated 16 February 2000

UNIFORM PROVISIONS CONCERNING THE APPROVAL OF VEHICLES WITH REGARD TO THE EMISSION OF POLLUTANTS ACCORDING TO ENGINE FUEL REQUIREMENTS

UNITED NATIONS

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*/ Former title of the Agreement:

Agreement Concerning the Adoption of Uniform Conditions of Approval and Reciprocal Recognition of Approval for Motor Vehicle Equipment and Parts, done at Geneva on 20 March 1958.

GE.00- 23895

Contents, Annexes, add a new heading to read:

"Annex 11: Procedure for verifying the conformity of production requirements."

Paragraph 1.1., add at the end: */

"..... four wheels.

It does not apply to vehicles with an unladen mass of less than 400 kg, or to vehicles with a design speed not exceeding 50 km/h.

At the request of the manufacturer, type approval according to this Regulation may be extended from M1 or N1 category vehicles equipped with compression-ignition engines which have already been type approved, to M2 or N2 category vehicles having a reference mass not exceeding 2,840 kg and meeting the conditions of paragraph 7. (extension of approval)."

Paragraph 1.2., amend the reference to paragraph 8.3.1.1.2. to read 8.2.2.

Paragraph 4.4.1., footnote 1/, amend to read:

"1/ ... 24 for Ireland, ... 32 for Latvia, 33 (vacant), 34 for Bulgaria, 35-36 (vacant), 37 for Turkey, 38-39 (vacant), 40 for The former Yugoslav Republic of Macedonia, 41 (vacant), 42 for the European Community (Approvals are granted by its Member States using their respective ECE symbol), 43 for Japan, 44 (vacant), 45 for Australia and 46 for Ukraine. Subsequent numbers ....."

Paragraph 5.2.3. becomes paragraph 5.2.2.

Paragraph 5.3.1.1., amend the reference to Figure 2 to read Figure 1.

Paragraph 5.3.1.4., amend to read:

"5.3.1.4. Subject to the requirements of paragraph 5.3.1.5., the test ..."

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*/ Corrigendum 1 to Supplement 1 to the 03 series of amendments.

Paragraph 5.3.1.4.2.1., amend the limits for N1 vehicles to read:

"

Category of vehicle		Reference mass Rm (kg)	Limit values	
			Mass of carbon dioxide L1 (g/km)	Combined mass of hydrocarbons and nitrogen oxides L2 (g/km)
M 5/		all	2.2	0.5
N1 6/	Class I	Rm ≤ 1 250	2.2	0.5
	Class II	1 250 < Rm ≤ 1 700	4.0	0.6
	Class III	1 700 < Rm	5.0	0.7

5/ (Unchanged)
6/ (Unchanged)"

Paragraph 5.3.1.4.3.1., amend the limits for N1 vehicles to read:

Category of vehicle		Reference mass Rm (kg)	Limit values		
			Mass of carbon monoxide L1 (g/km)	Combined mass of hydrocarbons and nitrogen oxides L2 (*) (g/km)	Mass of particulates L4 (*) (g/km)
M 5/		all	1.0	0.7 (0.9)	0.08 (0.10)
N1 6/	Class I	Rm ≤ 1 250	1.0	0.7 (0.9)	0.08 (0.10)
	Class II	1 250 < Rm ≤ 1 700	1.25	1.0 (1.3)	0.12 (0.14)
	Class III	1 700 < Rm	1.5	1.2 (1.6)	0.17 (0.20)

(*) The values in brackets concern vehicles fitted with compression ignition engines of the direct injection type up to 30 September 1999.

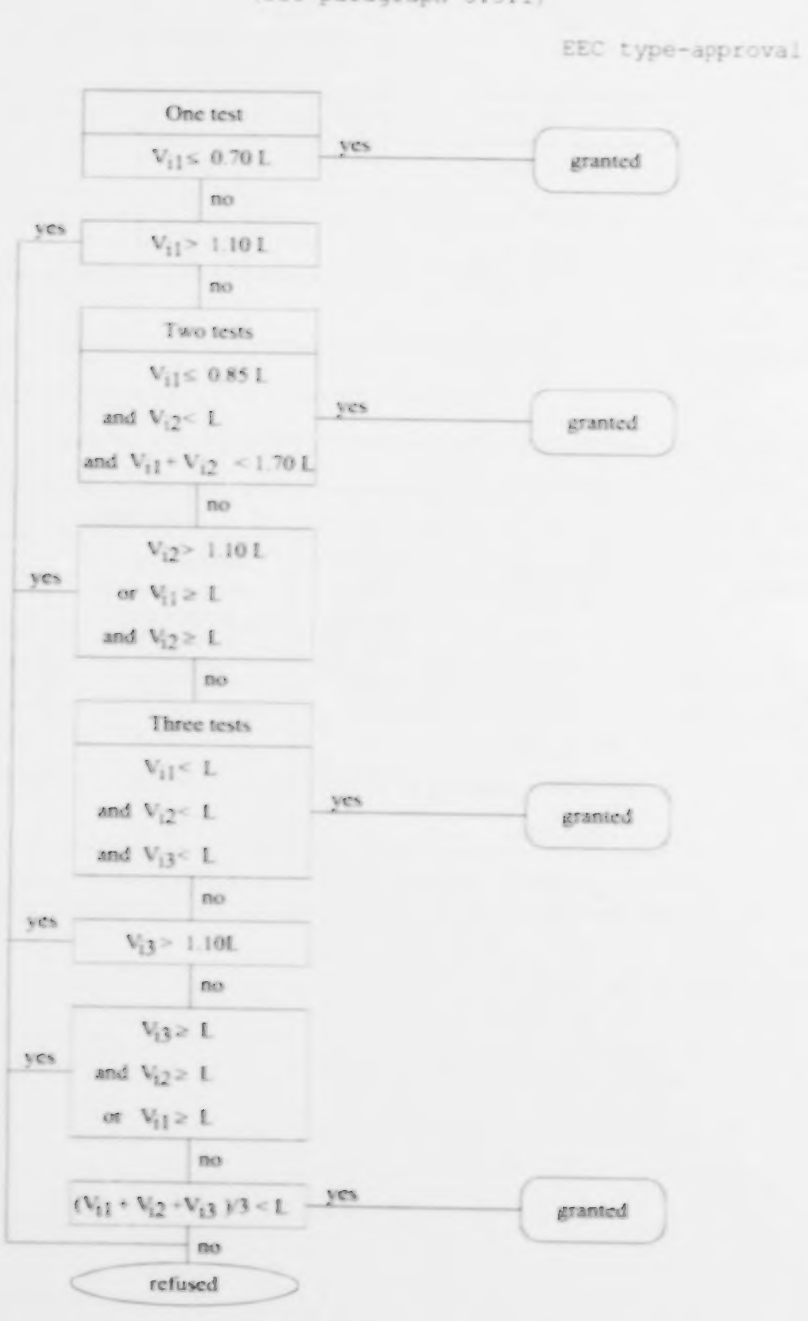
5/ (Unchanged)
6/ (Unchanged)"

Figure 1, amend as follows:

"Figure 1

Flow chart for the approval system type I tests

(see paragraph 5.3.1)



Paragraph 5.3.1.4.4., delete footnote 3/ and the reference to it at the end of the second paragraph.

Paragraph 5.3.1.4.5., delete.

Paragraph 5.3.5.3., amend to read:

"5.3.2.1. This test shall be carried out on vehicles powered by a positive-ignition engine not covered by the test referred to in paragraph 5.3.1.4.2. and the vehicles referred to in paragraphs 5.3.1.4.1 and 5.3.1.4.1.2."

Paragraph 5.3.5.3., end, amend to read:

"... with the requirements of paragraphs 5.3.4.4.2., 5.3.1.4.3 and 8.2.2."

Paragraph 7.1.1.1., amend to read:

"... requiring the use of the two next highest equivalent inertias or any lower equivalent inertia."

Paragraph 7.1.1.2., amend to read:

"... requires the use of an equivalent inertia lower than that used for the vehicle type already approved, extension ..."

Paragraph 7.7.1.1., insert "Cylinder bore centre to centre dimensions" after "Number of cylinders".

Paragraph 7.7.1.2., Catalytic converter, correct the second and last points to read:

"- size and shape of catalytic converters (volume of monolith ± 10%)
...

- Location of catalytic converters (...). This temperature variation shall be checked under stabilized conditions, at a speed of 120 km/h and the load setting of type I test.

- Air injection:
..."

Paragraph 7.7.1.3, amend to read:

"7.7.1.3. Inertia category: the two inertia categories immediately above and any inertia category below."

Paragraph 8., amend to read:

"8. CONFORMITY OF PRODUCTION

Procedures for conformity of production shall conform to those of Appendix 2 of the Agreement (E/ECE/324-E/ECE/TRANS/505/Rev.2), with the following requirements:"

Paragraph 8.2.2.1., amend to read:

"... the tests will be carried out either on the vehicle(s) described in the initial information package or on the vehicle described in the information sheet relating to the relevant extension. After presentation to the authorities ..."

Paragraphs 13. to 13.3.2., delete.

Annex 3, in the examples of the approval marks and in the captions below, amend the approval number "032439" to read "042439" (six times), and amend "03 series of amendments" to read "04 series of amendments" (three times).

Annex 4,

Paragraph 4.1.4.2, amend to read:

"... the accuracy ... must be 5% at 120, 100, 80, 60 and 40 km/h, and 10% ..."

Paragraph 4.1.5.2., amend to read:

"... at steady speeds of 120, 100, 80, 60, 40 and 20 km/h. The means ..."

Paragraph 4.2.3., delete the first sentence and figure 1.

Paragraph 4.2.7., amend to read:

"... as near as possible to the vehicle without adversely affecting his operation."

Paragraph 4.3.1.2., amend to read:

"...
Measurement error shall not exceed approximately 2% (intrinsic error of analyser) disregarding the true value for the calibration gases.

For concentrations of less than 100 ppm the measurement error shall not exceed approximately 2 ppm. The ambient air sample shall be measured on the same analyser with an appropriate range.

The microgram balance used to determine the weight of all filters shall have an accuracy of 5 µg and readability of 1 µg."

Paragraph 4.3.2., third paragraph, replace the third sentence with the following text:

"...
The sampling probe for the test gas flow for particulates shall be so arranged within the dilution tract that a representative sample gas flow can be taken from the homogeneous air/exhaust mixture and an air/exhaust gas mixture temperature of 325 k (52 °C) is not exceeded immediately before the particulate filter. The temperature ..."

Paragraph 5.1., replace the table by the following table (including the sentence which follows the table):

"

Reference mass of vehicle (Rm) (kg)	Equivalent inertia I (kg)
Rm ≤ 480	455
480 < Rm ≤ 540	510
540 < Rm ≤ 595	570
595 < Rm ≤ 650	625
650 < Rm ≤ 710	680
710 < Rm ≤ 765	740
765 < Rm ≤ 850	800
850 < Rm ≤ 965	910
965 < Rm ≤ 1 080	1 020
1 080 < Rm ≤ 1 190	1 130
1 190 < Rm ≤ 1 305	1 250
1 305 < Rm ≤ 1 420	1 360
1 420 < Rm ≤ 1 530	1 470
1 530 < Rm ≤ 1 640	1 590
1 640 < Rm ≤ 1 760	1 700
1 760 < Rm ≤ 1 870	1 810
1 870 < Rm ≤ 1 980	1 930
1 980 < Rm ≤ 2 100	2 040
2 100 < Rm ≤ 2 210	2 150
2 210 < Rm ≤ 2 380	2 270
2 380 < Rm ≤ 2 610	2 270
2 610 < Rm	2 270

If the corresponding equivalent inertia is not available on the dynamometer, the larger value closest to the vehicle reference mass shall be used."

Paragraph 6.1.1., amend to read:

"... the dynamometer setting shall be indicated in paragraphs 5.1 and 5.2.

At the request of the manufacturer, vehicles fitted with positive-ignition engines may be preconditioned with one Part I and two Part II driving cycles.

After this preconditioning, specific ..."

Paragraph 6.1.3., amend to read:

"6.1.3. At the end of the first 40-second idling period (see paragraph 6.2.2.) a current of air of variable speed shall be blown over the vehicle. The blower speed shall be such that, within the operating range of 10 km/h to at least 50 km/h, the linear velocity of the air at the blower outlet is within approximately 5 km/h of the corresponding roller speed. The final selection of the blower shall have the following characteristics:

- Area: at least 0.2 m^2;
- Height of the lower edge above ground: approximately 20 cm;
- Distance from the front of the vehicle: approximately 30 cm.

The blower speed may also be at least 6 m/s (21.6 km/h).

For special vehicles (e.g. vans, off-road), the height of the cooling fan can also be modified at the request of the manufacturer."

Paragraph 6.1.4., amend to read:

"6.1.4. During the test the speed is recorded against time or collected by the data-acquisition system so that the correctness of the cycles performed can be assessed."

Paragraph 6.3.1., amend to read:

"6.3.1. Manual-shift or semi-automatic gearbox, see Appendix 1 to this Annex, tables 1.2 and 1.3.".

Paragraphs 6.3.1.1. to 6.3.1.6., delete.

Annex 4 - Appendix 1, table 1.4 and figure 1/4, delete.

Annex 4 - Appendix 2,

Paragraph 1.1., replace 100 km/h by 120 km/h.

Paragraph 1.2.2., amend to read:

"1.2.2. The load absorbed by the brake and the chassis dynamometer internal frictional effects between the speeds of 0 and 120 km/h is as follows:

$F = (a + b \cdot V^2) \pm 0.1 \cdot F_{80}$ (without being negative)

where:

F = total load absorbed by the chassis dynamometer (N)
a = value equivalent to rolling resistance (N)
b = value equivalent to coefficient of air resistance [N/(km/h)^2]
V = speed (km/h)
F_{80} = load at 80 km/h (N)."

Paragraph 2.1., amend to read:

"2.1. Introduction

"This Appendix describes the method to be used to determine the load absorbed by a dynamometer brake. The load absorbed comprises the load absorbed by frictional effects and the load absorbed by the power-absorption device.

The dynamometer is brought into operation ..."

Paragraph 2.2., amend to read:

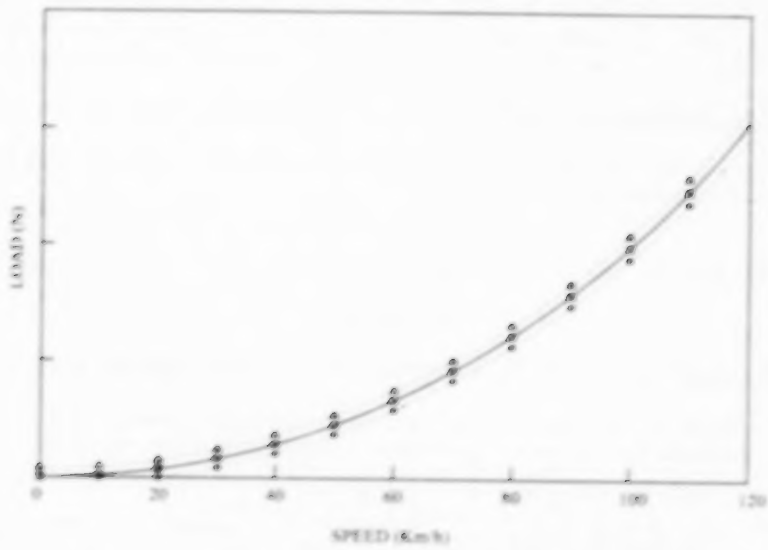
"2.2. Calibration of the load indicator to 80 km/h as a function of the load absorbed.

The following procedure ..."

Figure 2/1, replace by the following figure:

"Figure 2/1

Diagram illustrating the load of the chassis dynamometer



□ - F = a + b . V² ● - (a + b . V²) - 0.1 . F_m △ - (a + b . V²) + 0.1 . F_m"

Paragraph 2.2.5., amend to read:

"2.2.5. Note the load indicated F_i (N)."

Paragraph 2.2.10., amend to read:

"... to cover the range of loads used."

Paragraph 2.2.11., amend to read:

"2.2.11. Calculate the load absorbed using the formula:

$$F = \frac{M_i \cdot \Delta V}{t}$$

where:

F = load absorbed (N)
M_i = equivalent inertia in kg (excluding the inertial effects of the free rear roller)
ΔV = Speed deviation in m/s (10 km/h = 2.775 m/s)
t = time taken by the roller to pass from 85 km/h to 75 km/h."

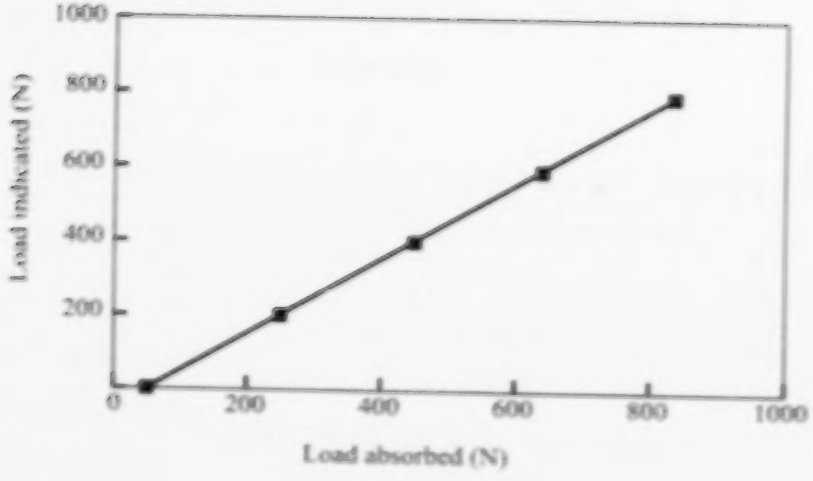
Paragraph 2.2.12., amend to read:

"2.2.12. Figure 2/2 shows the load indicated at 80 km/h in terms of the load absorbed at 80 km/h."

Figure 2.2, replace by the following figure:

"Figure 2/2

Load indicated at 80 km/h in terms of the load absorbed at 80 km/h



Paragraph 2.3., amend to read:

"2.3. Calibration of the load indicator as a function of the absorbed load for other speeds.

The procedure is described in paragraph 2.2. ..."

Paragraph 2.4., amend to read:

"2.4. Verification of the load absorption curve of the dynamometer from a reference setting at a speed of 80 km/h"

Paragraph 2.4.2., amend to read:

"2.4.2. Adjust the dynamometer to the absorbed load (F) at 80 km/h."

Paragraph 2.4.3., amend to read:

"2.4.3. Note the load absorbed at 120, 100, 80, 60, 40 and 20 km/h."

Paragraph 2.4.4., amend to read:

"2.4.4. Draw the curve F (V) and verify ..."

Paragraph 2.4.5., replace "power P_a" by "load F".

Paragraph 3.1., amend to read:

"3.1. Setting method

The dynamometer setting may be carried out at a constant speed of 80 km/h in accordance with the requirements of Appendix 3 to this Annex."

Paragraph 3.2., amend to read:

"3.2. Alternative method

With the manufacturer's agreement the following method may be used:"

Insert new paragraphs 3.2.1, and 3.2.2., to read:

"3.2.1. The brake is adjusted so as to absorb the load exerted at the driving wheels at a constant speed of 80 km/h, in accordance with the following table:

Reference mass of vehicle	Equivalent inertia	Power and load absorbed by the dynamometer at 80 km/h		Coefficients	
				a	b
Rm (kg)	kg	KW	N	N	N/(km/h)²
Rm ≤ 480	455	3.8	171	3.8	0.0261
480 < Rm ≤ 540	510	4.1	185	4.2	0.0282
540 < Rm ≤ 595	570	4.3	194	4.4	0.0296
595 < Rm ≤ 650	625	4.5	203	4.6	0.0309
650 < Rm ≤ 710	680	4.7	212	4.8	0.0323
710 < Rm ≤ 765	740	4.9	221	5.0	0.0337
765 < Rm ≤ 850	800	5.1	230	5.2	0.0351
850 < Rm ≤ 965	910	5.6	252	5.7	0.0385
965 < Rm ≤ 1 080	1 020	6.0	270	6.1	0.0412
1 080 < Rm ≤ 1 190	1 130	6.3	284	6.4	0.0433
1 190 < Rm ≤ 1 305	1 250	6.7	302	6.8	0.0460
1 305 < Rm ≤ 1 420	1 360	7.0	315	7.1	0.0481
1 420 < Rm ≤ 1 530	1 470	7.3	329	7.4	0.0502
1 530 < Rm ≤ 1 640	1 590	7.5	338	7.6	0.0515
1 640 < Rm ≤ 1 760	1 700	7.8	351	7.9	0.0536
1 760 < Rm ≤ 1 870	1 810	8.1	365	8.2	0.0557
1 870 < Rm ≤ 1 980	1 930	8.4	378	8.5	0.0577
1 980 < Rm ≤ 2 100	2 040	8.6	387	8.7	0.0591
2 100 < Rm ≤ 2 210	2 150	8.8	396	8.9	0.0605
2 210 < Rm ≤ 2 380	2 270	9.0	405	9.1	0.0619
2 380 < Rm ≤ 2 610	2 270	9.4	423	9.5	0.0646
2 610 < Rm	2 270	9.8	441	9.9	0.0674

3.2.2. In the case of vehicles other than passenger cars, with a reference mass of more than 1,700 kg or vehicles with permanent all-wheel drive, the power values given in the table set out in paragraph 3.2.1. are multiplied by the factor 1.3."

Paragraphs 3.3. and 3.3.2., delete.

Annex 4 - Appendix 3,

Insert the following new paragraphs 4.1. to 4.1.5.:

"4.1. Selection of the test vehicle

If not all variants of a vehicle type are measured, the following criteria for the selection of the test vehicle shall be used.

4.1.1. Body

If there are different types of body, the test shall be performed on the least aerodynamic body. The manufacturer shall provide the necessary data for the selection.

4.1.2. Tyres

The widest tyre shall be chosen. If there are more than three tyre sizes, the widest minus one shall be chosen.

4.1.3. Testing mass

The testing mass shall be the reference mass of the vehicle with the highest inertia range.

4.1.4. Engine

The test vehicle shall have the largest heat exchanger(s).

4.1.5. Transmission

A test shall be carried out with each type of the following transmission:

- front-wheel drive
- rear-wheel drive
- full-time 4 x 4
- part-time 4 x 4
- automatic gearbox
- manual gearbox

Former paragraphs 4.1. to 4.3.4. become paragraphs 4.2. to 4.4.4.

Insert a new paragraph 5.1.1.2.8., to read:

"5.1.1.2.8. The power (P) determined on the track shall be corrected to the reference ambient conditions as follows:

$$P_{Corrected} = K \cdot P_{Measured}$$

$$K = \frac{R_R}{R_T} \cdot [1 + K_R (t - t_0)] + \frac{R_{AERO}}{R_T} \cdot \frac{\rho_0}{\rho}$$

where:

R_R = rolling resistance at speed V
R_{AERO} = aerodynamic drag at speed V
R_T = total driving resistance = $R_R + R_{AERO}$
K_R = temperature correction factor of rolling resistance, taken to be equal to: $8.64 \cdot 10^{-3}$/°C, or the manufacturer's correction factor that is approved by the authority
t = road test ambient temperature
t_0 = reference ambient temperature = 20° C
ρ = air density at the test conditions
ρ_0 = air density at the reference conditions (20° C, 100 kPa)

The ratios R_R/R_T and R_{AERO}/R_T shall be specified by the vehicle manufacturer on the basis of the data normally available to the company.

If these values are not available, subject to the agreement of the manufacturer and the technical service concerned, the figures for the rolling/total resistance given by the following formula may be used:

$$\frac{R_R}{R_T} = a.M+b$$

where:

M = vehicle mass in kg

and for each speed the coefficients a and b are shown in the following table:

V (km/h)	a	b
20	$7.24 \cdot 10^{-5}$	0.82
40	$1.59 \cdot 10^{-4}$	0.54
60	$1.96 \cdot 10^{-4}$	0.33
80	$1.85 \cdot 10^{-4}$	0.23
100	$1.63 \cdot 10^{-4}$	0.18
120	$1.57 \cdot 10^{-4}$	0.14

"

Paragraph 5.1.2.2.6., amend to read:

"5.1.2.2.6. Adjust the brake to reproduce the corrected power (paragraph 5.1.1.2.8.) and to take into account the difference between the vehicle mass (M) on the track and the equivalent inertia test mass (I) to be used. This may be done by calculating the mean corrected road coast down time from V_2 to V_1 and reproducing the same time on the dynamometer by the following relationship:

$$T_{corrected} = \frac{T_{measured}}{K} \cdot \frac{I}{M}$$

K = value specified in paragraph 5.1.1.2.8."

Add a new paragraph 5.1.2.2.7., to read:

"5.1.2.2.7. The power P_a to be absorbed by the dynamometer shall be determined in order to enable the same power (paragraph 5.1.1.2.8.) to be reproduced for the same vehicle on different days."

Paragraph 5.2.1.2.2., amend to read:

"5.2.1.2.2. Record the torque $C_{(t)}$ and speed over a period of at least 20 seconds. The accuracy of the data recording system shall be at least ± 1 Nm for the torque and ± 0.2 km/h for the speed."

Paragraph 5.2.1.2.5., amend to read:

"5.2.1.2.5 The test shall be carried out three times in each direction. Determine the average torque from these six measurements for the reference speed. If the average speed deviates by more than 1 km/h from the reference speed, a linear regression shall be used for calculating the average torque."

Insert a new paragraph 5.2.1.2.7., to read:

"5.2.1.2.7. The average torque C_t determined on the track shall be corrected to the reference ambient conditions as follows:

$$C_{t\ corrected} = K \cdot C_{t\ measured}$$

where K has the value specified in paragraph 5.1.1.2.8. of this Appendix."

Paragraph 5.2.2.2.3., amend to read:

"5.2.2.2.3. Adjust the power absorption unit to reproduce the corrected total track torque indicated in paragraph 5.2.1.2.7."

Insert a new paragraph 5.2.2.2.4., to read:

"5.2.2.2.4. Proceed with the same operations as in paragraph 5.1.2.2.7., for the same purpose."

Paragraphs 5.3. to 5.4.2.2.5., delete.

Annex 4 - Appendix 4,

Paragraph 1, amend to read:

"... phase of the operating cycle. The manufacturer of the dynamometer shall indicate a method for verifying the specifications according to paragraph 3."

Paragraphs 5. to 5.4., delete.

Annex 4 - Appendix 5,

Paragraphs 3.3. to 3.3.1.15. and figure 5/5, delete.

Annex 4 - Appendix 8,

Paragraph 1.5.1.1., amend to read:

" ...

saturation vapour pressure: P_d = 2.81 kPa of H_2O at 23 °C."

Paragraph 1.5.2.1., amend to read:

"1.5.2.1. Humidity correction factor (K) (see formula 6):

$$H = \frac{6.211 \cdot R_a \cdot P_d}{P_b - P_d \cdot R_a \cdot 10^{-2}}$$

$$H = \frac{6.211 \cdot 60 \cdot 3.2}{101.33 - (2.81 \cdot 0.6)}$$

$$H = 10.5092$$

$$k_H = \frac{1}{1-0.0329 \cdot (H-10.71)}$$

$$k_H = \frac{1}{1-0.0329 \cdot (10.5092 - 10.71)}$$

$$k_H = 0.9934$$ "

Paragraph 1.5.2.3., amend the last two lines to read:

"...

$$M_{NO_x} = 70 \cdot 51961 \cdot 2.05 \cdot 0.9934 \cdot 10^{-4} \cdot \frac{1}{d}$$

$$M_{NO_x} = \frac{7.41}{d}\ g/km$$ "

Annex 6,

Paragraph 3.2., second table, replace "type I tests" by "type I test at 50 km/h."

Annex 7,

Paragraph 5.1.5., amend to read:

"5.1.5. The fuel tank(s) is (are) refilled with the specified test fuel at a temperature below 287 K (14° C), to 40% ± 2% of its/their normal fuel capacity. The vehicle fuel cap(s) shall not be replaced at this point."

Insert a new paragraph 7.3.6., to read:

"7.3.6. At the request of the manufacturer, the functional capacity for venting can be demonstrated by an equivalent alternative procedure. The specific procedure should be demonstrated by the manufacturer to the technical service during the type approval procedure."

Insert a new paragraph 7.4.4.3., to read:

"7.4.4.3. At the request of the manufacturer an alternative purge test procedure can be used, if the procedure has been presented to and has been accepted by the technical service during the type approval procedure."